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FINANCIAL IMPACT OF RECENT CONTRACT PRICING CHANGES

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EXECUTIVE SUMMARY

Three major changes to contract pricing policy for negotiated DoD contracts have occurred since 1982. Progress payments were reduced; the weighted guidelines profit policy was revised; and the methods by which the contractor can recover the cost of special tooling and test equipment (STTE) were changed. We conducted an impartial assessment of the cumulative financial effects of those changes. Our findings are based on the results of a simulation of monthly contract cash flows for a representative production contract. The simulation shows results using pricing policies applicable in 1982 compared to those in effect in October 1987.

We used two alternative measures of the effects of changes in contract pricing: profit as a percent of sales and internal rate of return (IRR) on monthly cash flow. We have carefully selected representative characteristics for DoD contractors, contracts, and policies, for the results are sensitive to those characteristics and may change substantially if other values are used. Our findings on contract returns apply to the negotiated portion of a contractor's business base. Total returns for a contractor include the results from additional work undertaken as a result of competitive selection or commercial work and are not considered in this study.

We found that under both measures of return, the pricing changes decreased DoD contractor profitability. Our results indicate a modest 10 percent reduction in pretax return on sales from 8.3 percent in 1982 to 7.5 percent. A much greater reduction in pretax returns was found for IRR on pretax cash flow which decreased 43 percent from 22.9 percent to 13.1 percent. The major cause of this negative impact is the reduction in progress payment rate in two steps, from 90 percent to 80 percent and then from 80 percent to 75 percent. Return on sales shows a minimal decrease in profitability because that measure does not take into account the effects of increased contractor investment and the deferral of cash inflow.

Greater reliance on fixed-price contracts, more unallowable costs, increased Federal income taxes, and increased use of competition during follow-on production are not considered in our analysis. Most would likely reduce anticipated return even more. The magnitude of the decline in financial return suggests that DoD should examine the reduced profitability anticipated on its work with an eye towards ensuring its competitiveness with contractor's alternative investment opportunities.

Preliminary results of this study were made available to DoD in October 1987. Since that time, the weighted guidelines profit policy has been finalized, amortization policy for STTE has been clarified, and the progress payment rate is scheduled to be increased. Our results represent policies in place at that time without considering any of the subsequent adjustments.

RECENT CHANGES

Pricing Changes:

- Reduced progress payment rate:
  - 90 percent to 75 percent in two steps
- Revised weighted guidelines (WGL) profit policy to:
  - Correct unintended increase of 1 percentage point
  - Improve relationship of profit to cost, risk, facilities investment, and working capital
- Special tooling and test equipment (STTE) now partially capitalized

External Conditions:

- Lower interest rates
- More contractor facilities capital investment

RECENT CHANGES

Three major changes in contract pricing policy for negotiated contracts have occurred since 1982: progress payment rates were reduced; weighted guidelines profit policy was revised; and recovery methods for special tooling and test equipment (STTE) were changed In addition, current credit market conditions are considerably different than those in 1982. Since interest rates influence contract pricing, they must also be considered in a proper evaluation of the effects of contract pricing changes.

Progress payment rates on fixed-price contracts have been reduced incrementally from 90 percent to 80 percent and then to 75 percent. The first change recognized the significant drop in market interest rates that had occurred and the second reduction served congressional fiscal constraints. This study considered the endpoint values of 90 percent and 75 percent as the "old" and "new" values, respectively. The major effect of reduced progress payment rates is to require the contractor to invest more money in working capital; the contractor must wait to recapture that investment until some or all of the costs are liquidated through deliveries under the contract.

The Defense Financial and Investment Review (DFAIR) concluded that previous policy had resulted in an unintended increase in objective ("going-in") profit rates. The weighted guidelines profit policy was revised in 1987 to reduce objective profit rates by 1 percentage point. The new policy also relates profit objectives more directly to contractor cost, risk, and investment in facilities and working capital.

Equipment dedicated to the contractor's use in performing a single contract or program is considered STTE. In 1982, DoD policy allowed contractors to charge STTE to the Government as direct costs. A portion of STTE (not to exceed 50 percent) is now treated as a capital investment that is recovered through amortization over the life of the applicable contract or program. At the time of this study, STTE qualifies for Cost Accounting Standard (CAS) 414 Cost of Money but does not earn profit on facilities capital.

External economic conditions directly influence contractor profitability. Prevailing interest rates affect the contractor's cost of carrying facilities and working capital. Pursuant to CAS 414, market interest rates determine a contractor's reimbursement for facilities capital investment (cost of money). These external factors and DoD pricing policy are interdependent, and the effects of both must be assessed to present an accurate and complete picture.

This study was limited to the changes discussed above. Greater reliance on fixed-price contracts for R&D, more unallowable costs (other than interest), and greater use of competition during follow-on production all impact contract return. They were not considered because of lack of quantifiable data on the extent of change. Tax effects were also omitted since DoD's contract pricing is pretax and never has been changed to offset changes in corporate income taxes imposed at the Federal level.

FINANCIAL MEASURES

- Return on sales (ROS)
- Internal rate of return (IRR) on monthly cash flow
- Results sensitive to measures
  - ROS insensitive to investment and timing
  - IRR captures both investment and timing

FINANCIAL MEASURES

Two standard measures of financial return were used to assess contractor profitability: return on sales (ROS) and internal rate of return (IRR). Both measures show a decrease in return but the magnitude of that decrease depends on the measure.

ROS, the simpler of the measures, is defined as the ratio of profit to sales, where sales is defined as the contract price. "Profit" includes negotiated profit plus CAS 414 Cost of Money, less unallowable costs, and less or plus overruns and underruns, respectively. ROS is sometimes called margin. It is not affected by the level of contractor investment or the timing of contractor costs and revenues.

IRR is a more complex profitability measure used in business to evaluate individual projects such as a new investment or, in our case, a specific contract. IRR is the rate that equalizes the present values of cash inflows and outflows. It considers the level and timing of contractor investment as well as other costs and the timing of payments to the contractor by DoD. Timing of inflows and outflows is important on the principle that a dollar earned today is worth more than a dollar earned a year from today. The recently completed study by the MAC Group entitled *The Impact on Defense Industrial Capability of Changes in Procurement and Tax Policy 1984 – 1987* employed net present value (NPV) of cash flow as its preferred measure of return. IRR and NPV are equivalent concepts except that IRR solves for the rate of return while NPV examines whether the cash flow is positive or negative at a specified rate of return.

ROS is less suitable than IRR in assessing contractor profitability because it does not reflect changes in contractor investment or cash flow timing, both of which are affected by recent contract pricing policy changes. IRR, therefore, is preferable because it reflects the level of contractor investment and the timing of cash flows.

CASH FLOW MODEL
Cash Flow for a Contract

Contractor Cash Flow	Month 1	2	.....	n
Inflows: + Progress payments/cost reimbursement Allowable noncapital costs Depreciation CAS 414 + Liquidations Allowable noncapital costs Depreciation CAS 414 Negotiated profit				
Outflows: – Investment – Allowable noncapital costs – Unallowables – (Underrun)/overrun				
Monthly Net Cash Flow (NCF)	NCF_1	NCF_2	.....	NCF_n

CASH FLOW MODEL

We developed a cash flow model to assess profitability and to measure ROS and IRR for individual DoD contracts. The model shows contractor monthly cash inflows and outflows through the life of the contract and computes net cash flow and final profitability.

Contractor cash inflows take two forms: progress payments and liquidation payments. Monthly progress payments for fixed-price contracts reimburse the contractor for a portion of the costs incurred in performing the contract. Those costs include allowable operating (noncapital) costs, depreciation on capital facilities, and CAS 414 Cost of Money. Liquidation payments are made when the contractor makes deliveries under the contract, and they include the remainder of costs not reimbursed through progress payments as well as the negotiated profit on the delivered items. Cost-type contracts are generally reimbursed at 100 percent of cost plus associated profit on a monthly basis.

Contractor cash outflows may be divided into four segments: capital investment, allowable operating costs, unallowable costs, and underruns/overruns. Capital investment has two forms: general-purpose investment in facilities and equipment used for various work efforts and STTE dedicated to work on a specific contract or program. Allowable operating costs are labor, materials, general and administrative (G&A), and other costs incurred in performing the contract. Unallowable costs principally include: interest on working capital used by the contractor, and overceiling bid, proposal, and independent research and development costs. Underruns and overruns are variances from the originally negotiated operating cost of the contract. From these, inflows and outflows, monthly net cash flow, and hence IRR, may be determined. ROS is generated from total contact dollar values.

MODEL VARIABLES

Policy

- Product type (manufacturing or R&D/service)
- Contract type (fixed-price or cost-reimbursement)
- Profit policy (new or old)
- STTE recovery method (direct charge or capitalized)
- Progress payment rate
- CAS 414 interest rate

Contract

- Total allowable noncapital cost (ANC)
- ANC timing profile
- ANC breakdown (among labor, material, G&A, and other)
- Delivery schedule
- STTE as a percentage of ANC
- Facilities Capital Employed (FCE) as a percentage of ANC
- FCE breakdown among service lives
- Debt/equity ratio for general capital investment
- Unallowable costs as a percentage of ANC
- Contract length in months
- Depreciation method (straight-line or accelerated)
- Overrun/underrun as a percentage of ANC

MODEL VARIABLES

Government contracts are complex activities, taking into consideration many different factors which may be divided into two groups. Policy variables depend on prevailing pricing policies and external economic conditions. Contract variables are characteristics that vary from one contract to another.

Data obtained from the Deputy Assistant Secretary of Defense (Procurement) [DASD(P)] Office of Cost, Pricing, and Finance were principally used in arriving at reasonable, representative values for contract variables. Additional data from the DFAIR study were also employed for such variables as contract length, delivery schedules, average overrun and the fixed portion of unallowable costs. A detailed description of variables and the values used and underlying sources is given in Appendix A. Policy variables were appropriately altered to perform the assessment of policy change effects. Our model permits changes to all contract and policy variables.

PRETAX RETURNS FOR A FIXED-PRICE PRODUCTION CONTRACT

(1.5 percent overrun)

	ROS	IRR
UNDER 1982 POLICIES	8.3%	22.9%
Progress payments	– 0.8%	– 9.9%
Special tooling	0.3%	0.3%
Profit policy (WGL)	– 1.1%	– 2.0%
Changed financial conditions	0.8%	1.8%
UNDER 1987 POLICIES	7.5%	13.1%

PRETAX RETURNS FOR A FIXED-PRICE PRODUCTION CONTRACT

We assessed the profitability of a DoD negotiated fixed-price production contract -- the dominant contract type. Results are presented to show the step-by-step impact of going from 1982 policies and economic conditions to October 1987 policies and conditions. Each row of results shows the effect of a particular policy change on profitability, and the cumulative results are shown on the bottom line. Based on DFAIR data, a 1.5 percent overrun was incorporated as a variable in the model contract.

ROS shows the smaller effect, principally coming from reduced progress payment rates and changes to the weighted guidelines profit policy. Reduced progress payment rates increase unallowable costs because the contractor incurs more interest on the increased working capital it must employ in the course of contract performance. The changed weighted guidelines effectively correct the "going-in" profit rate by about 1 percentage point and thus are consistent with the recommendation of the DFAIR study and subsequent congressional direction.

Profitability, when measured by IRR, is seen to have been significantly reduced. IRR on pretax cash flow falls about 40 percent from 23 percent to 13 percent. Reduced progress payment rates cause the contractor to receive cash inflows later in the contract. Since IRR takes into account the timing of contractor cash flow, the large reduction attributed to reduced progress payment rates is due mainly to these delayed cash inflows.[1]

The reason for the disparity between the IRR results and the ROS results is that IRR is sensitive to contractor cash flow timing and investment. ROS considers only overall profit and costs, ignoring contractor investment and cash-flow timing.

[1]The weighted guidelines now in effect include a self-adjusting mechanism to accommodate future changes in progress payment policy. Reduced progress payments are offset by more profit and increased progress payments are offset by less profit.

CONCLUSIONS

Recent changes:

- Yield a little less profit (ROS)
- Require much greater contractor investment to cover working capital
- Result in substantial reductions in IRR

CONCLUSIONS

Contract policy changes since 1982 have reduced pretax profitability anticipated on negotiated DoD work. The magnitude of those reductions depends on the profitability measure used; contractors receive slightly fewer profit dollars, but are required to invest significantly more of their own money in performing DoD work. This increased investment results in reduced IRR, a measure often used by contractors to assess the profit potential of alternative projects. Varying the assumptions and inputs to the model will alter the results obtained; however, the parameters used in this report are based on representative contract values and prevailing economic conditions. On that basis, reductions in pretax IRR on the order of 40 percent can be anticipated.

As potential profitability of DoD work drops, large diversified firms may consider other options more desirable than DoD work. Our finding in this study of declining profitability needs to be considered in that context. Otherwise, DoD could face a diminishing and less capable supplier base.

APPENDIX A

MODEL VARIABLES

MODEL VARIABLES

POLICY

- *Product Type* – Either manufacturing or R&D/service. This only matters under 1982 profit policy.

- *Contract Type* – Either fixed price or cost-type. Fixed-price assumes a progress payment percentage of 75 percent or 90 percent, depending on whether the new or old profit policy has been selected. Cost-type assumes a cost-reimbursement rate of 100 percent.

- *Profit Policy* – New profit policy incorporates revised guidance on handling special tooling and test equipment (STTE), the new weighted guidelines (WGL) profit policy, and a 75 percent progress payment rate.

- *STTE Recovery Method* – Under the old profit policy, STTE is directly charged as a cost in the first month of the contract, and is reimbursed through progress and liquidation payments. Under the new policy, 50 percent of the expenditure for STTE is capitalized. The unamortized remaining net book value of STTE receives Cost Accounting Standard (CAS) 414 Cost of Money but not profit on facilities capital employed. The user may choose to depreciate STTE over either the life of the contract (default choice) or the lives of three contracts. Our results assume depreciation over the life of one contract.

- *Progress Payment Percentage* – Not normally variable. Under the old policy, it is 90 percent for fixed-price contracts. Under the new policy, it is 75 percent for fixed-price contracts. Reimbursement for cost-type contracts under either policy is 100 percent. These percentages may be manually altered for demonstration purposes.

- *CAS 414 Interest Rate* – Rate determined by U.S. Government as chargeable for the cost of carrying facilities capital. The model uses 14 percent for 1982–1983 policy and 8.9 percent for 1987 policy. The facilities capital base to which the rate is applied is taken from DD Form 1499. The reader is cautioned that the DD 1499 facilities capital is for a single contract. For use in our model, to determine the cost of money payment, the facilities capital base must be divided by the contract length because the model works on monthly cash flow.

CONTRACT

- *Total Allowable Noncapital Cost (ANC)* – The total value for labor, overhead, and materials as negotiated prior to contract placement.

- *ANC Timing Profile* – The user may specify a straight-line noncapital cost timing profile, a noncapital cost timing profile conforming to a front-loaded curve, or a profile in which the user enters month-by-month values.

- *ANC Breakdown* – Under today's policies, noncapital costs are broken down between general and administrative (G&A) and other. Default values are taken from DD Form 1499 data and are 10 percent and 90 percent, respectively. More detailed cost categories are used for the 1982 WGL policy.

- *Delivery Schedule* – The user may select a standard schedule of deliveries evenly spread over the last 7 months of the contract or may manually enter a delivery schedule.

- *STTE as a Percentage of ANC* – The user selects a value for STTE as a percentage of allowable noncapital costs. The default value is 3 percent for production contracts.

- *Facilities Capital Employed (FCE) as a Percentage of ANC* – Based on data from DD Forms 1499, average FCE is currently 13.9 percent for production contracts. The old value is 10.8 percent. These values may be adjusted.

- *FCE Breakdown* – Total FCE is divided between buildings and equipment, with 37 percent of FCE attributed to buildings. The 63 percent for equipment is split evenly among equipment with 5-, 10-, and 15-year service lives. The division of FCE among buildings and the different categories of equipment may be adjusted.

- *Debt/Equity Ratio for General Capital Investment* – User may specify debt/equity financing ratios for facilities and each category of equipment. This ratio influences the cash outflow associated with capital investment used in the calculation of the internal rate of return (IRR).

- *Unallowables as a Percentage of ANC* – Unallowable costs are represented as a percentage of allowable noncapital costs. The default value is 2.2 percent; the user may adjust the percentage. An additional amount of unallowable interest cost is calculated for interest on working capital.

- *Contract Length* – The model currently supports contracts 20, 30, or 40 months long. It may be adjusted to accommodate contracts of other lengths.

- *Depreciation Method* – The user selects either straight-line or accelerated. The accelerated method is an adaptation of the "sum-of-the-years'-digits" method.

- *Overrun/Underrun as a Percentage of ANC* – The user specifies a percentage by which allowable noncapital costs vary from the negotiated cost. In our analysis, an overrun of 1.5 percent of contract price was used based on an average of 14 years experience. This experience is reported in the Defense Financial and Investment Review (DFAIR) (called performance difference) and ranged from a high of 2.9 percent to a low of 0.8 percent. This percentage is then applied proportionately over the contract life. A negative percentage indicates an underrun.

APPENDIX B

NOTES ON GENERAL PURPOSE CAPITAL INVESTMENT

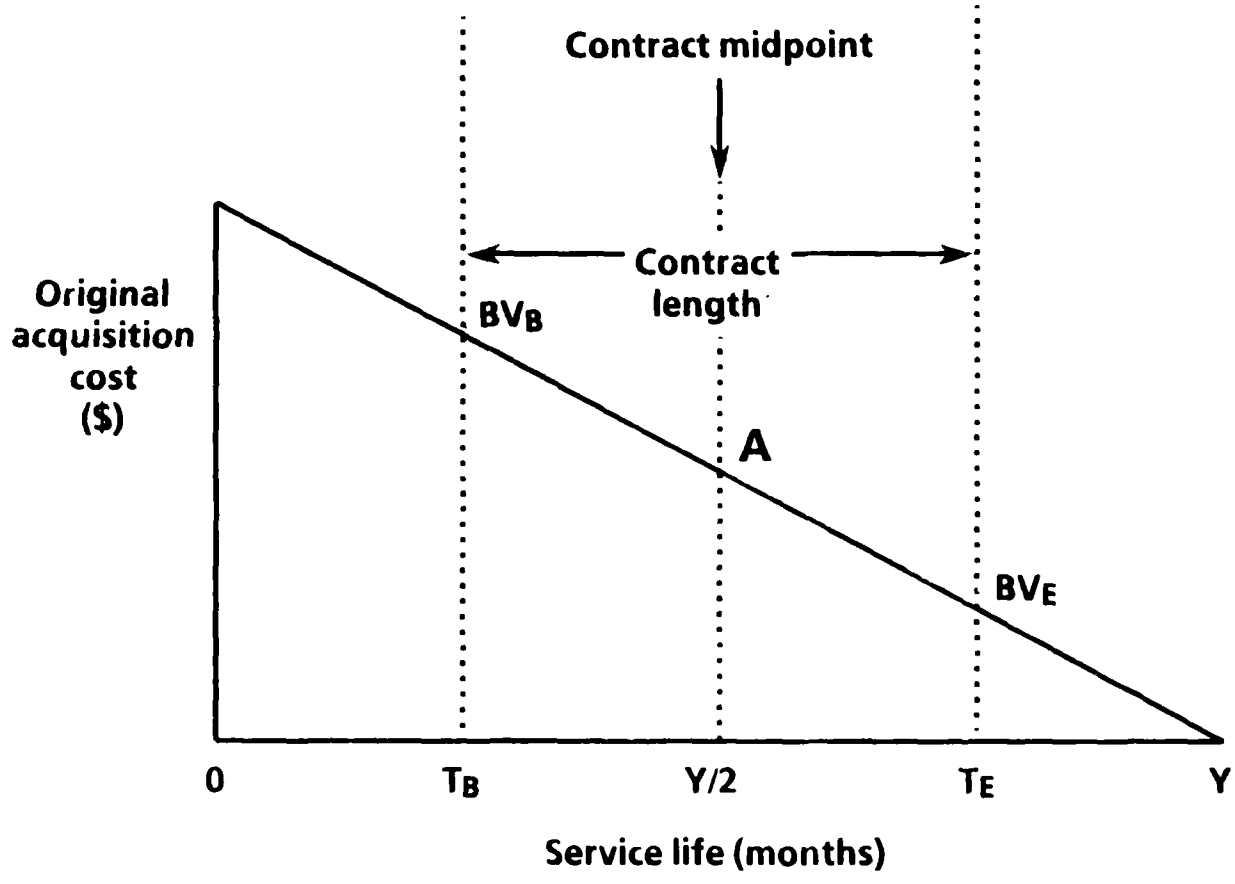
NOTES ON GENERAL PURPOSE CAPITAL INVESTMENT

INTRODUCTION

On average, today's production contracts employ 13.9 cents of facilities capital for each dollar of allowable noncapital cost. This represents the net book value for the buildings and equipment used. By applying this value to the value of allowable noncapital costs, we can determine a total value for Facilities Capital Employed (FCE). Approximately 37 percent of FCE is assumed to relate to buildings with an average service life of 30 years; 63 percent of FCE is related to equipment. For purposes of this model, FCE attributable to equipment has been broken equally among equipment with 5-, 10-, and 15-year service lives. (In this appendix, these different service lives are referred to as "categories" of investment.)

The model described here demonstrates return to a fairly large contractor with a sizable investment in general-purpose facilities and equipment. Since such a contractor is continually acquiring new facilities and equipment to replace old, fully depreciated items, we assume that on average, the midpoint of any one contract coincides with the midpoint of the aggregated service lives of the facilities and equipment to be charged to that contract.

EQUIPMENT BOOK VALUE OVER SERVICE LIFE



Note: Y = Service life; $T_E - T_B = n$ = Contract length.

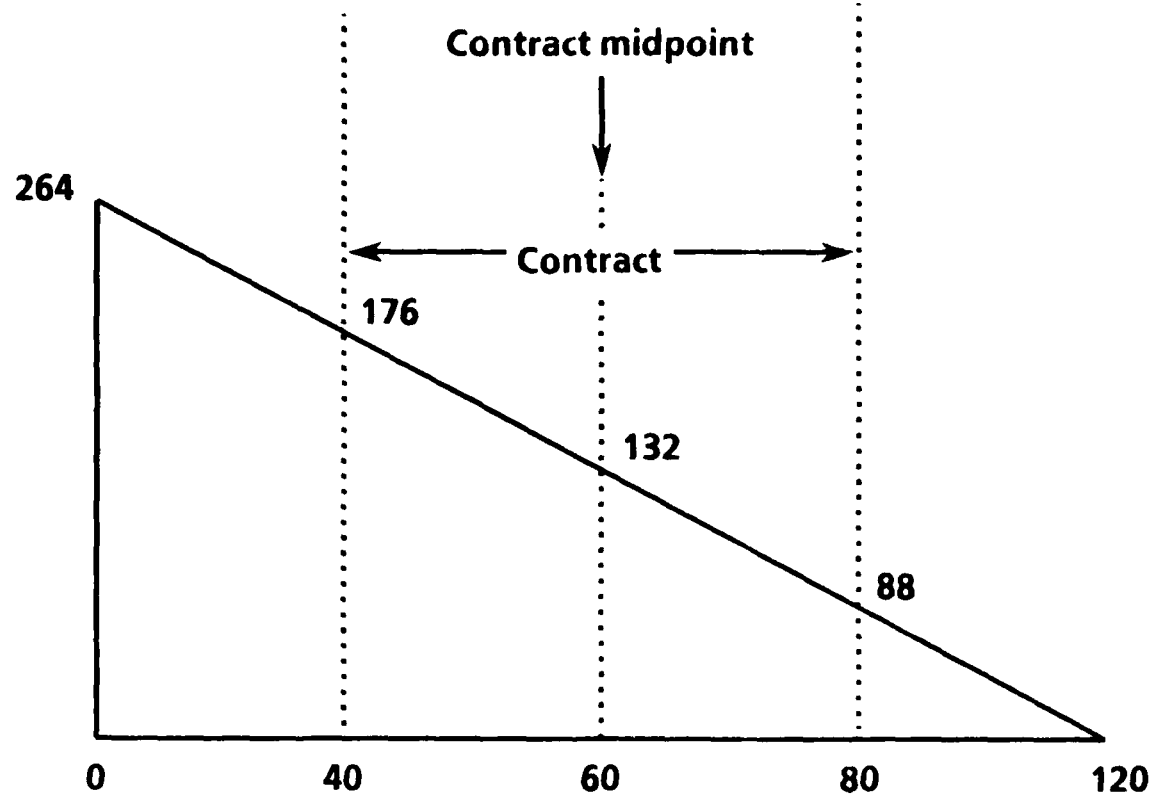
EQUIPMENT BOOK VALUE OVER SERVICE LIFE

The diagram on the facing page represents a category with a service life of Y months, depreciated by the straight-line method over the service life. The midpoint of the service life is then Y/2, which is also the midpoint of the contract. The contract begins at T_B and ends at T_E. The average FCE for any given category will be the value, A, at the midpoint of both the contract and the service life. Book values at the beginning and end of the contract, BV_B and BV_E, respectively, are the points noted at T_B and T_E. Knowing A, which is derived strictly from contract noncapital costs, we may calculate BV_B and BV_E and the category's original acquisition cost.

The depreciated value of facilities and equipment to be charged to the contract is given by the difference $BV_B - BV_E$ for each category. These values are added together, and the total is the depreciation charged against the contract.

Cost of Facilities Capital (CAS) 414 is computed by applying the specified cost-of-money rate against the aggregate book value for facilities and equipment through the contract life. Book value increments between BV_B and BV_E are calculated based on the contract length and depreciation method (either straight-line or accelerated).

EQUIPMENT BOOK VALUE OVER 10-YEAR SERVICE LIFE

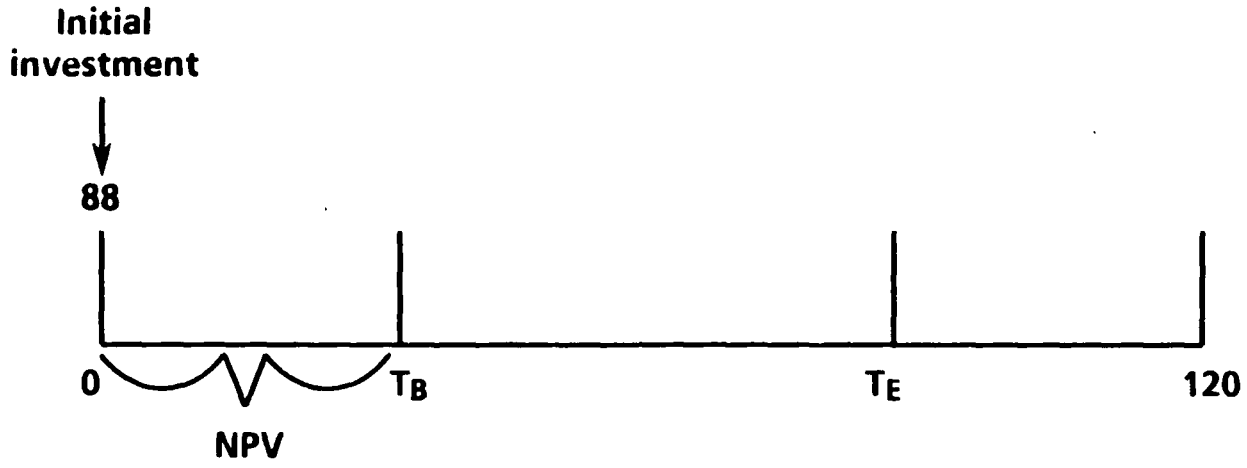


EQUIPMENT BOOK VALUE OVER 10-YEAR SERVICE LIFE

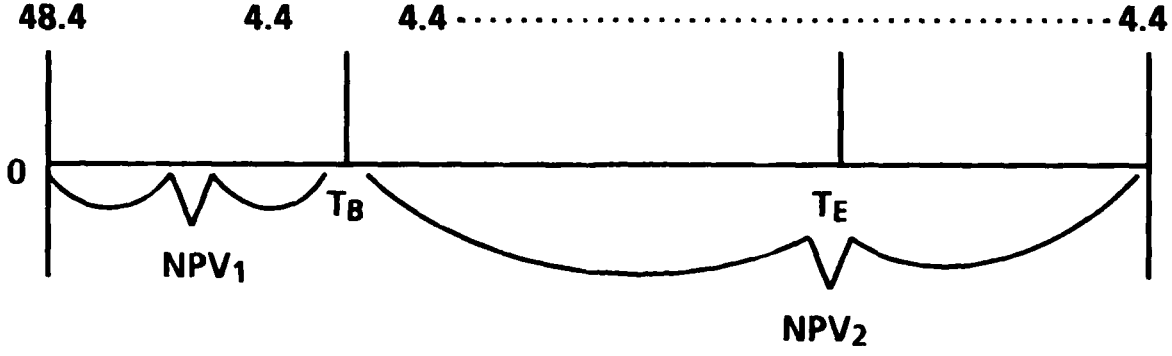
In this example, average FCE for equipment with a 10-year service life has been calculated as $132 (see figure on facing page). From that value, the beginning and ending book values for 10-year equipment have been calculated as $176 and $88, respectively. The original acquisition cost of the aggregate 10-year equipment has been calculated as $264.

Since the difference between beginning and ending book values is $88, $2.2 will be depreciated each month, and CAS 414 for 10-year equipment will be based on a book value decreasing from $176 to $88.

CASH-FLOW REPRESENTATION



SPLIT NET PRESENT VALUE (NPV) COMPUTATIONS



$$NPV = NPV_1 + NPV_2$$

CASH-FLOW REPRESENTATION

Investment must also be represented as an outflow for cash-flow purposes. Since, on average, investments for each category are made at some time prior to contract commencement, a one-time cash investment equal to the depreciated value for the category does not recognize the time value of money. As shown in the diagram, an accurate cash-flow representation is to take the net present value (NPV) of the investment over the time from initial investment to the beginning of the contract (T_B). The NPV computations are performed on the value of the investment to be charged to the contract in question.

Another complicating factor is the possibility that only part of the initial investment was made from contractor equity, and that the remainder was financed over the service life of the equipment. This factor will change the NPV computation of the initial investment. As shown in the figure above, if only half the initial investment were made from contractor equity, a series of principal and interest payments would be made over the service life. The correct NPV computation would then be the sum of NPV_1 and NPV_2; that is, the sum of the NPV for the investment and payments made before contract start, and the NPV for the stream of payments made after contract start, as shown on the facing chart.

The final NPV value is entered as a simulated cash outflow for the first month of the contract.